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☐ 1. Document ID: US 20030104979 A1

L3: Entry 1 of 25 File: PGPB Jun 5, 2003

PGPUB-DOCUMENT-NUMBER: 20030104979
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030104979 A1

TITLE: Methods of inhibiting desiccation of cuttings removed from ornamental plants

PUBLICATION-DATE: June 5, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Wei, Zhong-Min	Kirkland	WA	US	
Leon, Ernesto	Coyacan		MX	
Oviedo, Agustin	Celaya		MX	

US-CL-CURRENT: 514/2; 800/323

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. Desc | Image

☐ 2. Document ID: US 20030028918 A1

L3: Entry 2 of 25 File: PGPB Feb 6, 2003

PGPUB-DOCUMENT-NUMBER: 20030028918
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20030028918 A1

TITLE: Method of imparting drought resistance to plants

PUBLICATION-DATE: February 6, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Wei, Zhong-Min	Kirkland	WA	US	

US-CL-CURRENT: 800/278; 800/288

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. Desc | Image

☐ 3. Document ID: US 20020116733 A1

L3: Entry 3 of 25 File: PGPB Aug 22, 2002

PGPUB-DOCUMENT-NUMBER: 20020116733
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020116733 A1

TITLE: Hypersensitive response induced resistance in plants by seed treatment

PUBLICATION-DATE: August 22, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Qiu, Dewen	Seattle	WA	US	
Wei, Zhong-Min	Kirkland	WA	US	
Beer, Steven V.	Ithaca	NY	US	

US-CL-CURRENT: 800/278

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 4. Document ID: US 20020066122 A1

L3: Entry 4 of 25 File: PGPB May 30, 2002

PGPUB-DOCUMENT-NUMBER: 20020066122
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020066122 A1

TITLE: Hypersensitive response elicitor from Xanthomonas campestris

PUBLICATION-DATE: May 30, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Wei, Zhong-Min	Kirkland	WA	US	
Swanson, Shane S.	Seattle	WA	US	
Fan, Hao	Bothell	WA	US	

US-CL-CURRENT: 800/279; 435/320.1, 435/6, 536/23.7

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 5. Document ID: US 20020062500 A1

L3: Entry 5 of 25 File: PGPB May 23, 2002

PGPUB-DOCUMENT-NUMBER: 20020062500
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020062500 A1

TITLE: Hypersensitive response eliciting domains and use thereof

PUBLICATION-DATE: May 23, 2002

L3: Entry 4 of 25 File: PGPB May 30, 2002

DOCUMENT-IDENTIFIER: US 20020066122 A1
TITLE: Hypersensitive response elicitor from Xanthomonas campestris

INVENTOR (1):
Wei, Zhong-Min

Summary of Invention Paragraph (5):
[0004] The hypersensitive response is a rapid, localized necrosis that is associated with the active defense of plants against many pathogens (Kiraly, Z., "Defenses Triggered by the Invader: Hypersensitivity," pages 201-224 in: Plant Disease: An Advanced Treatise, Vol. 5, J. G. Horsfall and E. B. Cowling, ed. Academic Press New York (1980); Klement, Z., "Hypersensitivity," pages 149-177 in: Phytopathogenic Prokarvotes, Vol. 2, M. S. Mount and G. H. Lacy, ed. Academic Press, New York (1982)). The hypersensitive response elicited by bacteria is readily observed as a tissue collapse if high concentrations (.gtoreq.10.sup.7 cells/ml) of a limited host-range pathogen like Pseudomonas syringae or Erwinia amylovora are infiltrated into the leaves of nonhost plants (necrosis occurs only in isolated plant cells at lower levels of inoculum) (Klement, Z., "Rapid Detection of Pathogenicity of Phytopathogenic Pseudomonads," Nature 199:299-300; Klement, et al., "Hypersensitive Reaction Induced by Phytopathogenic Bacteria in the Tobacco Leaf," Phytopatholoy 54:474-477 (1963); Turner, et al., "The Quantitative Relation Between Plant and Bacterial Cells Involved in the Hypersensitive Reaction," Phytopathology 64:885-890 (1974); Klement, Z., "Hypersensitivity," pages 149-177 in Phytopathogenic Prokaryotes, Vol. 2., M. S. Mount and G. H. Lacy, ed. Academic Press, New York (1982)). The capacities to elicit the hypersensitive response in a nonhost and be pathogenic in a host appear linked. As noted by Klement, Z., "Hypersensitivity," pages 149-177 in Phytopathogenic Prokaryotes, Vol. 2., M. S. Mount and G. H. Lacy, ed. Academic Press, New York, these pathogens also cause physiologically similar, albeit delayed, necroses in their interactions with compatible hosts. Furthermore, the ability to produce the hypersensitive response or pathogenesis is dependent on a common set of genes, denoted hrp (Lindgren, P. B., et al., "Gene Cluster of Pseudomonas syringae pv. `phaseolicola` Controls Pathogenicity of Bean Plants and Hypersensitivity on Nonhost Plants," J. Bacteriol. 168:512-22 (1986); Willis, D. K., et al., "hrp Genes of Phytopathogenic Bacteria," Mol. Plant-Microbe Interact. 4:132-138 (1991)). Consequently, the hypersensitive response may hold clues to both the nature of plant defense and the basis for bacterial pathogenicity.

Summary of Invention Paragraph (6):
[0005] The hrp genes are widespread in Gram-negative plant pathogens, where they are clustered, conserved, and in some cases interchangeable (Willis, D. K., et al., "hrp Genes of Phytopathogenic Bacteria," Mol. Plant-Microbe Interact. 4:132-138 (1991); Bonas, U., "hrp Genes of Phytopathogenic Bacteria," pages 79-98 in: Current Topics in Microbiology and Immunology: Bacterial Pathogenesis of Plants and Animals--Molecular and Cellular Mechanisms, J. L. Dangl, ed. Springer-Verlag, Berlin (1994)). Several hrp genes encode components of a protein secretion pathway similar to one used by Yersinia, Shigella, and Salmonella spp. to secrete proteins essential in animal diseases (Van Gijsegem, et al., "Evolutionary Conservation of Pathogenicity Determinants Among Plant and Animal Pathogenic Bacteria," Trends Microbiol. 1:175-180 (1993)). In E. amylovora, P. syringae, and P. solanacearum, hrp genes have been shown to control the production and secretion of glycine-rich protein elicitors of the hypersensitive response (He, S. Y., et al. "Pseudomonas Syringae pv. Syringae HarpinPss: a Protein that is Secreted via the Hip Pathway and

Elicits the Hypersensitive Response in Plants," Cell 73:1255-1266 (1993), Wei, Z. -M., et al., "HrpI of Erwinia amylovora Functions in Secretion of Harpin and is a Member of a New Protein Family," J. Bacteriol. 175:7958-7967 (1993); Arlat, M. et al. "PopA1, a Protein Which Induces a Hypersensitive-Like Response on Specific Petunia Genotypes, is Secreted via the Hrp Pathway of Pseudomonas solanacearum," EMBO J. 13:543-553 (1994)).

Summary of Invention Paragraph (7):
[0006] The first of these proteins was discovered in E. amylovora, a bacterium that causes fire blight of rosaceous plants, and was designated harpin (Wei, Z. -M., et al, "Harpin, Elicitor of the Hypersensitive Response Produced by the Plant Pathogen Erwinia amylovora," Science 257:85-88 (1992)). Mutations in the encoding hrpN gene revealed that harpin is required for E. amylovora to elicit a hypersensitive response in nonhost tobacco leaves and incite disease symptoms in highly susceptible pear fruit. The P. solanacearum GMI10000 PopA1 protein has similar physical properties and also elicits the hypersensitive response in leaves of tobacco, which is not a host of that strain (Arlat, et al. "PopA1, a Protein Which Induces a Hypersensitive-like Response on Specific Petunia Genotypes, is Secreted via the Hip Pathway of Pseudomonas solanacearum," EMBO J. 13:543-53 (1994)). However, P. solanacearum popA mutants still elicit the hypersensitive response in tobacco and incite disease in tomato. Thus, the role of these glycine-rich hypersensitive response elicitors can vary widely among Gram-negative plant pathogens.

Summary of Invention Paragraph (8):
[0007] Other plant pathogenic hypersensitive response elicitors have been isolated, cloned, and sequenced. These include: Erwinia chrysanthemi (Bauer, et. al., "Erwinia chrysanthemi Harpin.sub.Ech: Soft-Rot Pathogenesis," MPMI 8(4): 484-91 (1995)); Erwinia carotovora (Cui, et. al., "The RsmA.sup.- Mutants of Erwinia carotovora subsp. carotovora Strain Ecc71 Overexpress hrpN.sub.Ecc and Elicit a Hypersensitive Reaction-like Response in Tobacco Leaves," MPMI 9(7): 565-73 (1996)); Erwinia stewartii (Ahmad, et. al., "Harpin is not Necessary for the Pathogenicity of Erwinia stewartii on Maize," 8th Int'l. Cong. Molec. Plant-Microb. Inter. Jul. 14-19, 1996 and Ahmad, et. al., "Harpin is not Necessary for the Pathogenicity of Erwinia stewartii on Maize," Ann. Mtg. Am. Phytopath. Soc. Jul. 27-31, 1996); and Pseudomonas syringae pv. syringae (WO 94/26782 to Cornell Research Foundation, Inc.).

Detail Description Paragraph (7):
[0019] Suitable fragments can be produced by several means. In the first, subclones of the gene encoding the hypersensitive response elicitor protein of the present invention are produced by conventional molecular genetic manipulation by subcloning gene fragments. The subclones then are expressed in vitro or in vivo in bacterial cells to yield a smaller protein or peptide that can be tested for elicitor activity according to the procedure described, e.g., in Wei et al., "Harpin, Elicitor of the Hypersensitive Response Produced by the Plant Pathogen Erwinia amylovora," Science 257:85-86 (1992), which is hereby incorporated by reference in its entirety.

Detail Description Paragraph (50):
[0062] The method of imparting pathogen resistance to plants in accordance with the present invention is useful in imparting resistance to a wide variety of pathogens including viruses, bacteria, and fungi. Resistance, inter alia, to the following viruses can be achieved by the method of the present invention: Tobacco mosaic virus. Resistance, inter alia, to the following bacteria can also be imparted to plants in accordance with present invention: Pseudomonas spp., and Xanthomonas spp., and Erwinia spp. Plants can be made resistant, inter alia, to the following fungi by use of the method of the present invention: Fusarium spp., Phytophthora spp., Alternaria spp., and Botrytis spp. Imparting pathogen resistance to plants using hypersensitive response elicitors is disclosed in WO 96/39802 to Wei et al. and WO 98/24297 to Qiu et al., which are hereby incorporated by reference in their entirety.

Detail Description Paragraph (69):
[0081] In the alternative embodiment of the present invention involving the use of transgenic plants and transgenic seeds, a hypersensitive response elicitor need not (but may) be applied topically to the plants, plant seeds, plant cuttings, or

harvested fruits or vegetables. Instead, transgenic plants transformed with a DNA molecule encoding such a protein are produced according to procedures described above and well known in the art. The applied hypersensitive response elicitor need not be the same hypersensitive response elicitor expressed heterologously by the plant. A number of other hypersensitive response elicitors are known, including but not limited to those isolated from Erwinia spp., Pseudomonas spp., Clavibacter spp., and Phytophthora spp.

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Fan, Hao	Bothell	WA	US	
Wei, Zhong-Min	Kirkland	WA	US	

US-CL-CURRENT: 800/288; 435/183, 435/410, 530/350, 536/23.4, 800/279

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 6. Document ID: US 20020059658 A1

L3: Entry 6 of 25 File: PGPB May 16, 2002

PGPUB-DOCUMENT-NUMBER: 20020059658
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020059658 A1

TITLE: Methods of improving the effectiveness of transgenic plants

PUBLICATION-DATE: May 16, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Wei, Zhong-Min	Kirkland	WA	US	
DeRocher, Jay Ernest	Bothell	WA	US	

US-CL-CURRENT: 800/278; 504/116.1, 800/279

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 7. Document ID: US 20020019337 A1

L3: Entry 7 of 25 File: PGPB Feb 14, 2002

PGPUB-DOCUMENT-NUMBER: 20020019337
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020019337 A1

TITLE: Treatment of fruits or vegetables with hypersensitive response elicitor to inhibit postharvest disease or desiccation

PUBLICATION-DATE: February 14, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Wei, Zhong-Min	Kirkland	WA	US	
Qiu, Dewen	Seattle	WA	US	
Remick, Dean	Lake Placid	FL	US	

US-CL-CURRENT: 514/2; 800/279

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 8. Document ID: US 20020007501 A1

L3: Entry 8 of 25 File: PGPB Jan 17, 2002

PGPUB-DOCUMENT-NUMBER: 20020007501
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020007501 A1

TITLE: Receptors for hypersensitive response elicitors and uses thereof

PUBLICATION-DATE: January 17, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Song, Xiaoling	Woodinville	WA	US	
Fan, Hao	Bothell	WA	US	
Wei, Zhong-Min	Kirkland	WA	US	

US-CL-CURRENT: 800/279; 530/370, 536/23.6, 800/290, 800/301, 800/302

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
Draw Desc | Image

☐ 9. Document ID: US 20010011380 A1

L3: Entry 9 of 25 File: PGPB Aug 2, 2001

PGPUB-DOCUMENT-NUMBER: 20010011380
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20010011380 A1

TITLE: HYPERSENSITIVE RESPONSE ELICITOR FRAGMENTS ELICITING A HYPERSENSITIVE RESPONSE AND USES THEREOF

PUBLICATION-DATE: August 2, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
LABY, RON J.	HOUSTON	TX	US	
WEI, ZHONG-MIN	KIRKLAND	WA	US	
BEER, STEVEN V.	ITHACA	NY	US	

US-CL-CURRENT: 800/279

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 10. Document ID: US 6277814 B1

L3: Entry 10 of 25 File: USPT Aug 21, 2001

US-PAT-NO: 6277814
DOCUMENT-IDENTIFIER: US 6277814 B1

TITLE: Enhancement of growth in plants

DATE-ISSUED: August 21, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Qiu; Dewen	Seattle	WA		
Wei; Zhong-Min	Kirkland	WA		
Beer; Steven V.	Ithaca	NY		

US-CL-CURRENT: 514/2; 47/58.1R, 800/288

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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L3: Entry 3 of 25 File: PGPB Aug 22, 2002

DOCUMENT-IDENTIFIER: US 20020116733 A1
TITLE: Hypersensitive response induced resistance in plants by seed treatment

INVENTOR (2):
Wei, Zhong-Min

Summary of Invention Paragraph (27):
[0025] Examples of suitable bacterial sources of polypeptide or protein elicitors include Erwinia, Pseudomonas, and Xanthamonas species (e.g., the following bacteria: Erwinia amylovora, Erwinia chrysanthemi, Erwinia stewartii, Erwinia carotovora, Pseudomonas syringae, Pseudomonas solancearum, Xanthomonas campestris, or mixtures thereof).

Summary of Invention Paragraph (30):
[0028] In one embodiment of the present invention, the hypersensitive response elicitor polypeptides or proteins to be applied can be isolated from their corresponding organisms and applied to plants. Such isolation procedures are well known, as described in Arlat, M., F. Van Gijsegem, J. C. Huet, J. C. Pemollet, and C. A. Boucher, "PopA1, a Protein which Induces a Hypersensitive-like Response in Specific Petunia Genotypes is Secreted via the Hrp Pathway of Pseudomonas solanacearum," EMBO J. 13:543-553 (1994); He, S. Y., H. C. Huang, and A. Collmer, "Pseudomonas syringae pv. syringae Harpin.sub.Pss: a Protein that is Secreted via the Hrp Pathway and Elicits the Hypersensitive Response in Plants," Cell 73:1255-1266 (1993); and Wei, Z. -M., R. J. Laby, C. H. Zumoff, D. W. Bauer, S. -Y. He, A. Collmer, and S. V. Beer, "Harpin Elicitor of the Hypersensitive Response Produced by the Plant Pathogen Erwinia amylovora, Science 257:85-88 (1992), which are hereby incorporated by reference. See also pending U.S. patent application Ser. Nos. 08/200,024 and 08/062,024, which are hereby incorporated by reference. Preferably, however, the isolated hypersensitive response elicitor polypeptides or proteins of the present invention are produced recombinantly and purified as described below.

Summary of Invention Paragraph (33):
[0031] In another embodiment of the bacterial application mode of the present invention, the bacteria do cause disease and naturally contain a gene encoding a hypersensitive response elicitor polypeptide or protein. Examples of such bacteria are noted above. However, in this embodiment these bacteria are applied to plant seeds for plants which are not susceptible to the disease carried by the bacteria. For example, Erwinia amylovora causes disease in apple or pear but not in tomato. However, such bacteria will elicit a hypersensitive response in tomato. Accordingly, in accordance with this embodiment of the present invention, Erwinia amylovora can be applied to tomato seeds to impart pathogen resistance without causing disease in plants of that species.

Summary of Invention Paragraph (34):
[0032] The hypersensitive response elicitor polypeptide or protein from Erwinia chrysanthemi has an amino acid sequence corresponding to SEQ. ID. No. 1 as follows:

Summary of Invention Paragraph (35):
[0033] This hypersensitive response elicitor polypeptide or protein has a molecular weight of 34 kDa, is heat stable, has a glycine content of greater than 16%, and contains substantially no cysteine. The Erwinia chrysanthemi hypersensitive response

elicitor polypeptide or protein is encoded by a DNA molecule having a nucleotide sequence corresponding to SEQ. ID. No. 2 as follows:

Summary of Invention Paragraph (36):
[0034] The hypersensitive response elicitor polypeptide or protein derived from Erwinia amylovora has an amino acid sequence corresponding to SEQ. ID. No. 3 as follows:

Summary of Invention Paragraph (37):
[0035] This hypersensitive response elicitor polypeptide or protein has a molecular weight of about 39 kDa, it has a pI of approximately 4.3, and is heat stable at 100.degree. C. for at least 10 minutes. This hypersensitive response elicitor polypeptide or protein has substantially no cysteine. The hypersensitive response elicitor polypeptide or protein derived from Erwinia amylovora is more fully described in Wei, Z. -M., R. J. Laby, C. H. Zumoff, D. W. Bauer, S. -Y. He, A. Collmer, and S. V. Beer, "Harpin, Elicitor of the Hypersensitive Response Produced by the Plant Pathogen Erwinia amylovora," Science 257:85-88 (1992), which is hereby incorporated by reference. The DNA molecule encoding this polypeptide or protein has a nucleotide sequence corresponding to SEQ. ID. No. 4 as follows:

Summary of Invention Paragraph (46):
[0044] Isolation of Erwinia carotovora hypersensitive response elicitor protein or polypeptide is described in Cai, et al., "The RsmA.sup.- Mutants of Erwinia carotovora subsp. carotova Strain Ecc71 Overexpress hrpN.sub.Ecc and Elicit a Hypersensitive Reaction-Like Response in Tobacco Leaves," MPMI, 9(7):565-73 (1996), which is hereby incorporated by reference. The hypersensitive response elicitor protein or polypeptide for Erwinia stewartii is disclosed in Ahmad, et al., "Harpin is Not Necessary for the Pathogenicity of Erwinia stewartii on Maize," 8th Int'l. Cong. Molec. Plant-Microbe Interact, Jul. 14-19, 1996 and Ahmad, et al., "Harpin is Not Necessary for the Pathogenicity of Erwinia stewartii on Maize," Ann. Mtg. Am. Phytopath. Soc., Jul. 27-31, 1996, which are hereby incorporated by reference.

Summary of Invention Paragraph (53):
[0051] An example of a suitable fragment is the popA1 fragment of the hypersensitive response elicitor polypeptide or protein from Pseudomonas solanacearum. See Arlat, M., F. Van Gijsegem, J. C. Huet, J. C. Pemollet, and C. A. Boucher, "PopA1, a Protein Which Induces a Hypersensitive-like Response in Specific Petunia Genotypes is Secreted via the Hrp Pathway of Pseudomonas solanacearum," EMBO J. 13:543-53 (1994), which is hereby incorporated by reference. As to Erwinia amylovora, a suitable fragment can be, for example, either or both the polypeptide extending between and including amino acids 1 and 98 of SEQ. ID. NO. 3 and the polypeptide extending between and including amino acids 137 and 204 of SEQ. ID. No. 3.

Detail Description Paragraph (4):
[0079] Marglobe tomato seeds were submerged in hypersensitive response elicitor protein (ca. 26 .mu.gm/ml) from Erwinia amylovora solution or buffer in beakers on day 0 for 24 hours at 28.degree. C. in a growth chamber. After soaking seeds in hypersensitive response elicitor protein from Erwinia amylovora or buffer, they were sown in germination pots with artificial soil on day 1. Seedlings were transplanted to individual pots at the two-true-leaf stage on day 12. After transplanting, some plants that arose from treated seed also were sprayed with hypersensitive response elicitor protein (ca. 13 .mu.gm/ml) from Erwinia amylovora (Treatments 3 and 4).

Detail Description Paragraph (6):
[0081] The above procedure involved use of 10 seeds treated with hypersensitive response elicitor protein from Erwinia amylovora per treatment.

Detail Description Paragraph (8):
[0083] 1. Seeds soaked in hypersensitive response elicitor protein from Erwinia amylovora (ca. 26 .mu.mg/ml).

Detail Description Paragraph (10):
[0085] 3. Seeds soaked in hypersensitive response elicitor protein from Erwinia amylovora (ca. 26 .mu.mg/ml) and seedlings sprayed with hypersensitive response elicitor protein from Erwinia amylovora (ca. 13 .mu.gm/ml) at transplanting.

Detail Description Paragraph (11):
[0086] 4. Seeds soaked in buffer and seedlings sprayed with hypersensitive response elicitor protein from Erwinia amylovora (ca. 13 .mu.gm/ml) at transplanting.

Detail Description Paragraph (60):
[0123] The hypersensitive response elicitor protein encoded by the hrpN gene of Erwinia amylovora was used to treat seeds. It was produced by fermentation of the cloned gene in a high-expression vector in E. coli. Analysis of the cell-free elicitor preparation by high-pressure liquid chromatography indicated its hypersensitive response elicitor protein content and on that basis appropriate dilutions were prepared in water. Seeds were soaked in a beaker containing hypersensitive response elicitor protein concentrations of 0, 5, 25, and 50 .mu.gm/ml of hypersensitive response elicitor protein for 24 hours. They were removed, dried briefly on paper towels, and sown in the muck soil. Treated seed was arranged by row, 15 seeds in each row for each treatment; each flat contained two replicates, and there were six replicates. Thus, a total of 90 seeds were treated with each concentration of hypersensitive response elicitor protein. The flats containing the seeds were held in a controlled environment chamber operating at 60.degree. F. (15.6.degree. C.), with a 14-hour day/10-hour night. Observations were made on seedling emergence symptoms (smut lesions). The data were recorded 23 days after sowing.

Detail Description Paragraph (65):
[0126] The hypersensitive response elicitor protein encoded by the hrpN gene of Erwinia amylovora was used to treat seeds. It was produced by fermentation of the cloned gene in a high-expression vector in E. coli. Analysis of the cell-free elicitor preparation by high-pressure liquid chromatography indicated its hypersensitive response elicitor protein content and, on that basis, appropriate dilutions were prepared in water. Seeds were soaked in a beaker containing hypersensitive response elicitor protein concentrations of 0, 5, 10, and 20 .mu.gm/ml of hypersensitive response elicitor protein for 24 hours. They were removed, dried briefly on paper towels, and sown. The soil was a mixture of peat and Pearlite.TM. in plastic flats 10 inches wide, 20 inches long, and 2 inches deep. Treated seed was arranged by row, 6 seeds in each row for each treatment; each flat contained two replicates, and there were four replicates and thus a total of 24 seeds that were treated with each concentration of hypersensitive response elicitor protein. The flats containing the seeds were held in a controlled environment chamber operating at 75.degree. F. (25.degree. C.), with a 14-hour day/10-hour night.

CLAIMS:

3. A method according to claim 2, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from a pathogen selected from the group consisting of Erwinia, Pseudomonas, Xanthomonas, Phytophthora, and mixtures thereof.

4. A method according to claim 3, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from Erwinia chrysanthemi.

5. A method according to claim 3, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from Erwinia amylovora.

27. A pathogen-resistance imparting plant seed according to claim 26, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from a pathogen selected from the group consisting of Erwinia, Pseudomonas, Xanthomonas, Phytophthora, and mixtures thereof.

28. A pathogen-resistance imparting plant seed according to claim 27, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from Erwinia chrysanthemi.

29. A pathogen-resistance imparting plant seed according to claim 27, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived

from Erwinia amylovora.

42. A method according to claim 39, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from a pathogen selected from the group consisting of Erwinia, Pseudomonas, Xanthomonas, Phytophthora, and mixtures thereof.

43. A method according to claim 42, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from Erwinia chrysanthemi.

44. A method according to claim 42, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from Erwinia amylovora. the plant, but do cause disease in other plant species, and contain a gene encoding the hypersensitive response elicitor polypeptide or protein.

42. A method according to claim 39, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from a pathogen selected from the group consisting of Erwinia, Pseudomonas, Xanthomonas, Phytophthora, and mixtures thereof.

43. A method according to claim 42, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from Erwinia chrysanthemi.

44. A method according to claim 42, wherein the hypersensitive response elicitor polypeptide or protein corresponds to that derived from Erwinia amylovora.

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☐ 11. Document ID: US 6235974 B1

L3: Entry 11 of 25 File: USPT May 22, 2001

US-PAT-NO: 6235974
DOCUMENT-IDENTIFIER: US 6235974 B1
**** See image for Certificate of Correction ****

TITLE: Hypersensitive response induced resistance in plants by seed treatment with a hypersensitive response elicitor

DATE-ISSUED: May 22, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Qiu; Dewen	Seattle	WA		
Wei; Zhong-Min	Kirkland	WA		
Beer; Steven V.	Ithaca	NY		

US-CL-CURRENT: 800/301; 514/12, 514/2, 800/298, 800/305, 800/306, 800/307, 800/308, 800/309, 800/310, 800/311, 800/312, 800/313, 800/314, 800/315, 800/317, 800/317.1, 800/317.2, 800/317.3, 800/317.4, 800/318, 800/319, 800/320 , 800/320.1, 800/320.2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 12. Document ID: US 6228644 B1

L3: Entry 12 of 25 File: USPT May 8, 2001

US-PAT-NO: 6228644
DOCUMENT-IDENTIFIER: US 6228644 B1

TITLE: Hypersensitive response elicitor from Erwinia amylovora, its use, and encoding gene

DATE-ISSUED: May 8, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bogdanove; Adam J.	Ithaca	NY		
Kim; Jihyun Francis	Ithaca	NY		
Wei; Zhong-Min	Kirkland	WA		
Beer; Steven V.	Ithaca	NY		

US-CL-CURRENT: 435/419; 435/252.3, 435/320.1, 435/410, 435/468, 435/69.1, 536/23.1, 536/23.7, 800/295, 800/298, 800/301 , 800/305, 800/306, 800/307, 800/308, 800/309,

800/310, 800/311, 800/312, 800/313, 800/316, 800/317.4, 800/320, 800/323.2, 800/323.3

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 13. Document ID: US 6174717 B1

L3: Entry 13 of 25 File: USPT Jan 16, 2001

US-PAT-NO: 6174717
DOCUMENT-IDENTIFIER: US 6174717 B1

TITLE: Elicitor of the hypersensitive response in plants

DATE-ISSUED: January 16, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Beer; Steven V.	Ithaca	NY		
Wei; Zhong-Min	Ithaca	NY		
Bauer; David W.	Ithaca	NY		
Collmer; Alan	Ithaca	NY		
He; Sheng-Yang	Ithaca	NY		
Laby; Ron	Ithaca	NY		

US-CL-CURRENT: 435/252.33; 435/243, 435/252.1, 435/252.3, 435/320.1, 435/410, 435/418, 435/419, 435/6, 435/69.1, 435/71.1, 435/71.2, 530/350, 536/23.1, 536/23.7, 536/24.5, 800/278, 800/279, 800/288

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 14. Document ID: US 5977060 A

L3: Entry 14 of 25 File: USPT Nov 2, 1999

US-PAT-NO: 5977060
DOCUMENT-IDENTIFIER: US 5977060 A

TITLE: Insect control with a hypersensitive response elicitor

DATE-ISSUED: November 2, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zitter; Thomas A.	Ithaca	NY		
Wei; Zhong-Min	Kirkland	WA		

US-CL-CURRENT: 514/2; 530/350, 536/23.7, 536/23.74

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 15. Document ID: US 5859324 A

L3: Entry 15 of 25 File: USPT Jan 12, 1999

US-PAT-NO: 5859324
DOCUMENT-IDENTIFIER: US 5859324 A

TITLE: Hypersensitive response induced resistance in plants

DATE-ISSUED: January 12, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wei; Zhong-Min	Ithaca	NY		
Beer; Steven V.	Ithaca	NY		

US-CL-CURRENT: 800/298; 424/93.2, 424/93.4, 435/800, 435/847, 514/2, 800/301, 800/311, 800/317.3, 800/317.4

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 16. Document ID: US 5849868 A

L3: Entry 16 of 25 File: USPT Dec 15, 1998

US-PAT-NO: 5849868
DOCUMENT-IDENTIFIER: US 5849868 A

TITLE: Elicitor of the hypersensitive response in plants

DATE-ISSUED: December 15, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Beer; Steven V.	Ithaca	NY		
Wei; Zhong-Min	Ithaca	NY		
Bauer; David W.	Ithaca	NY		
Collmer; Alan	Ithaca	NY		
He; Sheng-Yang	Ithaca	NY		
Laby; Ron	Ithaca	NY		

US-CL-CURRENT: 530/350; 530/324, 530/326, 530/823, 530/825

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 17. Document ID: US 5776889 A

L3: Entry 17 of 25 File: USPT Jul 7, 1998

US-PAT-NO: 5776889
DOCUMENT-IDENTIFIER: US 5776889 A

TITLE: Hypersensitive response induced resistance in plants

DATE-ISSUED: July 7, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wei; Zhong-Min	Ithaca	NY		
Beer; Steven V.	Ithaca	NY		

US-CL-CURRENT: 514/2; 424/93.4, 424/93.47, 435/800, 435/847

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 18. Document ID: WO 9907206 A1

L3: Entry 18 of 25 File: EPAB Feb 18, 1999

PUB-NO: WO009907206A1
DOCUMENT-IDENTIFIER: WO 9907206 A1
TITLE: HYPERSENSITIVE RESPONSE ELICITOR FROM ERWINIA AMYLOVORA, ITS USE, AND ENCODING GENE

PUBN-DATE: February 18, 1999

INVENTOR-INFORMATION:

NAME	COUNTRY
BOGDANOVE, ADAM J	
KIM, JIHYUN FRANCIS	
WEI, ZHONG-MIN	
BEER, STEVEN V	

INT-CL (IPC): A01 G 13/00; A61 K 35/66; C12 N 1/20; C12 R 1/18
EUR-CL (EPC): C07K014/21; C07K014/27, C12N015/82 , C12N015/82 , C12N015/82

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 19. Document ID: WO 9854214 A2

L3: Entry 19 of 25 File: EPAB Dec 3, 1998

PUB-NO: WO009854214A2
DOCUMENT-IDENTIFIER: WO 9854214 A2
TITLE: HYPERSENSITIVE RESPONSE ELICITOR FRAGMENTS ELICITING A HYPERSENSITIVE RESPONSE AND USES THEREOF

PUBN-DATE: December 3, 1998

INVENTOR-INFORMATION:

NAME COUNTRY
LABY, RONALD J
WEI, ZHONG-MIN
BEER, STEVEN V

INT-CL (IPC): C07 K 14/00
EUR-CL (EPC): C07K014/27; C12N015/82, C12N015/82 , C12N015/82

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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☐ 20. Document ID: EP 1274307 A2 WO 200180639 A2 US 20020019337 A1 AU 200153593 A

L3: Entry 20 of 25 File: DWPI Jan 15, 2003

DERWENT-ACC-NO: 2002-041357
DERWENT-WEEK: 200306
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TITLE: Inhibiting post harvest disease (caused by Penicillium, Botrytis, Phytophthora, or Erwinia) or desiccation and enhancing the longevity in a fruits or vegetables, using hypersensitive response elicitor proteins or nucleic acids

INVENTOR: QIU, D; REMICK, D ; WEI, Z

PRIORITY-DATA: 2000US-198359P (April 19, 2000), 2001US-0835684 (April 16, 2001)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
EP 1274307 A2	January 15, 2003	E	000	A01N037/46
WO 200180639 A2	November 1, 2001	E	066	A01N037/46
US 20020019337 A1	February 14, 2002		000	C12N015/82
AU 200153593 A	November 7, 2001		000	A01N037/46

INT-CL (IPC): A01 N 37/18; A01 N 37/46; A01 N 63/00; A01 N 63/02; C12 N 15/82

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC
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